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(54) **SEMICONDUCTOR DEVICE AND METHOD OF FABRICATING THEREOF**

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(58) **Field of Search** 438/147, 217, 438/174, 194, 268, 289, 301

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,048,772 A * 4/2000 D'Anna
6,190,978 B1 * 2/2001 D'Anna
6,207,518 B1 * 3/2001 Akaishi et al.
6,255,154 B1 * 7/2001 Akaishi et al.
2001/0011745 A1 * 8/2001 Kushida

FOREIGN PATENT DOCUMENTS

JP 2000183181 A * 6/2000

* cited by examiner

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(57) **ABSTRACT**

To enhance the withstand voltage of an LD MOS transistor, a method of fabricating a semiconductor device according to the invention is characterized in that a process for forming a drift region is composed of a step for implanting phosphorus ions and arsenic ions different in a diffusion coefficient into the superficial layer of a substrate, a step for forming a selective oxide film (a first gate insulating film) 9A and an element isolation film 9B by selective oxidation and diffusing the phosphorus ions and the arsenic ions and a step for implanting and diffusing boron ions, and in that in the step for forming the selective oxide film 9A and the element isolation film 9B by selective oxidation in a state in which an oxide film and a polycrystalline silicon film are laminated on the substrate, only a drift region formation region is selectively oxidized in a state in which the polycrystalline silicon film is removed.

8 Claims, 7 Drawing Sheets